

# Thorite



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**Crystal Data:** Tetragonal; commonly metamict. *Point Group:*  $4/m\ 2/m\ 2/m$ . In square prisms, terminated by {111}, or pseudo-octahedral crystals, to 8 cm; also massive and compact.

**Physical Properties:** *Cleavage:* {110}, distinct. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 4.5–5 D(meas.) = 6.63–7.20 D(calc.) = 6.70 Paramagnetic; radioactive.

**Optical Properties:** Nearly opaque, transparent in thin fragments. *Color:* Yellow-orange, brownish yellow, brownish black, black. *Streak:* Light orange to dark brown. *Luster:* Vitreous to resinous or greasy.

*Optical Class:* Uniaxial (+).  $n = 1.664\text{--}1.87$  (metamict).  $\omega = 1.78\text{--}1.837$   $\epsilon = 1.79\text{--}1.840$

**Cell Data:** *Space Group:*  $I4_1/amd$ .  $a = 7.1328(2)$   $c = 6.3188(2)$   $Z = 4$

**X-ray Powder Pattern:** Synthetic  $\text{ThSiO}_4$ .

3.56 (10), 1.84 (10), 4.69 (9), 2.66 (8), 1.336 (8), 2.84 (7), 1.438 (7)

## Chemistry:

	(1)	(2)
SiO <sub>2</sub>	16.47	18.54
TiO <sub>2</sub>	0.10	
ThO <sub>2</sub>	71.61	81.46
UO <sub>2</sub>	8.36	
Al <sub>2</sub> O <sub>3</sub>	1.29	
RE <sub>2</sub> O <sub>3</sub>	0.54	
FeO	0.59	
PbO	0.10	
MgO	0.01	
H <sub>2</sub> O	0.86	
rem.	0.07	
Total	[100.00]	100.00

(1) Tuolumne River, California, USA; recalculated to 100.00% from original total of 97.24%.

(2)  $\text{ThSiO}_4$ .

**Polymorphism & Series:** Dimorphous with huttonite.

**Occurrence:** An accessory mineral in felsic igneous rocks and their associated pegmatites. As a detrital mineral in sediments.

**Association:** Zircon, monazite, gadolinite, fergusonite, uraninite, yttrialite, pyrochlore.

**Distribution:** In Norway, from Lomo, Brevik, and around the Langesundsfjord; at Ødegården, Bamble; also Arendal, Tvedestrand, Kragerø, and elsewhere. From Mendig, Eifel district, Germany. In Madagascar, at Ambatofotsy, Androtsabo, Befaritra, and elsewhere. In the USA, from the Baringer Hill pegmatite, 26 km west of Burnet, Llano Co., Texas; at St. Peters Dome, near Pikes Peak, El Paso Co., and the Powderhorn district, Gunnison Co., Colorado; from the Wet Mountains, Custer Co., Colorado. In Canada, as large but crude crystals from the McDonald mine, Hybla, and at Wilberforce, Ontario. Additional minor localities are known.

**Name:** For its content of *thorium*, in turn named for *Thor*, Scandinavian god of war.

**References:** (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 488–490.

(2) Pabst, A. (1951) X-ray examination of uranium and thorium. Amer. Mineral., 36, 557–562.

(3) Frondel, C. (1958) Systematic mineralogy of uranium and thorium. U.S. Geol. Sur. Bull.

1064, 265–276. (4) Taylor, M. and R.C. Ewing (1978) The crystal structures of the  $\text{ThSiO}_4$  polymorphs: huttonite and thorite. Acta Cryst., 34, 1074–1079.

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